Sensory Attributes of Non-irradiated and Irradiated Semi-dried Fish during Ambient Temperature Storage

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Ionizing radiations can be employed to extend shelf life of fresh flesh foods (Guevara *et al.*, 1989; Pushpa *et al.*, 1990), for eradication of *Salmonella* in frozen meat and meat products (Kamat *et al.*, 1991; Alur & Lewis, 1985), disinfestation of semi-dried fish (Farkas, 1987) and to extend shelf-stability of dried fish at ambient temperature (Doke *et al.*, 1978; Gore *et al.*, 1970; Agarwal *et al.*, 1972). Quality of foods during storage is monitored by employing microbiological, biochemical and sensory evaluation indices (Ghadi *et al.*, 1978). However, assessment of quality of irradiated flesh foods by microbiological methods is not reliable as radiation survivors, though proliferate equally well do not bring about spoilage of flesh foods (Alur *et al.*, 1971; 1989). Biochemical tests such as TBA, TVBN and TVA, though reliable, should always be supplemented with sensory data. Hence, sensory evaluation is of crucial importance in assessing the quality of irradiated foods. In this communication, irradiated semi-dried Bombay duck (*Harpodon nehereus*) and shrimps (*Penaeus indicus*) were subjected to sensory evaluation during storage at room temperature (26°C).

Semi-dried Bombay duck (*Harpodon nehereus*) and shrimp (*Penaeus indicus*) were obtained from local market at Bombay. Twentyfive grams of each variety was packed in polyethylene bags (200 gauge) and sealed. Several packets thus obtained were divided into two equal parts. One part was exposed to a radiation dose of 3 kGy in a ^{60}Co package irradiator (dose rate, 0.05 kGy/min) at ambient temperature and the remaining packages were maintained as unirradiated controls. Both unirradiated and irradiated packets containing semi-dried fish were stored at ambient temperature. At intervals of 3 weeks duplicate samples were withdrawn and served to the trained panelists consisting of eight members. The taste panelists were instructed to follow Miyauchi *et al.*, (1964) scale prior to giving scores for the samples. Panelists were also instructed to report any visible mould growth and insects in the semi-dried fish.

Sensory evaluation scores on odour and appearance by trained panelists were subjected to F-test. Differences between means were tested using Fisher's least significant difference as well as Student's *t*-test (Alder & Roessler, 1972).

Table 1 incorporates data on sensory evaluation of non-irradiated and irradiated Bombay duck on the basis of appearance and odour only. It can be seen that non-irradiated semi-dried Bombay duck were unacceptable organoleptically after six weeks of ambient temperature storage while under identical conditions irradiated samples scored 7. Unirradiated semi-dried Bombay duck showed the presence of insects after three weeks while no infestation could be observed in irradiated samples. Mould growth was not visible in irradiated samples while non-irradiated samples were rejected within 6 weeks due to visible heavy mould growth.

Table 2 incorporates similar data on sensory attributes of unirradiated and ir-

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Table 1. *Sensory evaluation of semi-dried non-irradiated and irradiated (3 kGy) Bombay duck during storage at ambient temperature(26°C).*

Samples	Storage period, weeks	Quality characteristics (scores) Appearance	Flavour (odour)	Overall	No. of insects detected, mould growth visible, etc.
Bombay duck control	0	6.00 ± 1.26	5.83 ± 1.42	5.80 ± 1.70	-
	3	6.25 ± 1.91	5.75 ± 1.75	5.38 ± 1.85	One insect found
	6	4.00 ± 0.00	4.75 ± 0.89	4.13 ± 0.35	1-2 insects and visible mould growth
	12	4.00 ± 0.54	3.25 ± 1.36	3.60 ± 0.94	"
Bombay duck (irradiated, 3 kGy)	0	7.00 ± 1.10	6.17 ± 1.83	6.42 ± 1.63	No insect and no mould growth
	3	7.13 ± 1.00	7.14 ± 1.35	7.13 ± 1.13	No insect and no mould growth
	6	7.38 ± 0.74***	7.00 ± 1.07***	7.38 ± 0.74***	"
	12	6.65 ± 1.20***	6.15 ± 1.00***	6.45 ± 0.83***	"

Significant difference in means between control and irradiated samples at level: **p<0.05; ***p<0.001

radiated (3 kGy) shrimps during ambient temperature storage. The unirradiated semi-dried shrimps became organoleptically unacceptable after six weeks storage with strong ammoniacal odour while irradiated shrimps received a score of 7. No ammoniacal odours were detected in irradiated samples. It was observed that unlike semi-dried Bombay duck, semi dried shrimps did not show the presence of insects or mould growth

Gamma irradiation of semi-dried Bombay duck and shrimps at a dose of 3 kGy controlled effectively infestation during prolonged storage. In addition mould growth was also controlled in Bombay duck. Ammoniacal odour found in non-irradiated shrimps was not detectable in ir-

Table 2. *Sensory evaluation of semi-dried non-irradiated and irradiated (3 kGy) tiny shrimps during storage at ambient temperature(26°C).*

Samples	Storage period, weeks	Quality characteristics (scores) Appearance	Flavour (odour)	Overall	No. of insects detected, mould growth visible, etc.
Unirradiated shrimps	0	6.83 ± 2.14	6.33 ± 1.86	6.33 ± 86	-
	3	6.00 ± 1.69	5.86 ± 1.77	5.50 ± 1.93	-
	6	6.00 ± 1.51	4.86 ± 1.57	4.88 ± 1.33	Strong ammonia smell
	12	6.00 ± 1.38	3.95 ± 1.21	5.05 ± 0.98	"
Irradiated (3 kGy) shrimps	0	6.83 ± 1.94	7.17 ± 1.17	7.33 ± 1.21	-
	3	7.88 ± 1.25*	7.25 ± 1.16	7.88*± 1.25	-
	6	7.63 ± 1.30*	6.75 ± 1.16*	7.25 ± 1.16***	-
	12	7.55 ± 1.17	7.05 ± 1.38***	7.40 ± 1.15***	-

Significant difference in means between control and irradiated samples at level: * p<0.05; *** p<0.001

radiated shrimps. Thus, gamma radiation resulted in insect-free, mould-free and acceptable semi-dried fish.

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